

Serial No. 09/742,204
Amdt. dated July 21, 2004
Reply to Office Action of April 21, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for fabrication of ferroelectric capacitor elements of an integrated circuit comprising:
 - deposition of an electrically conductive bottom electrode layer;
 - deposition of a layer of ferroelectric dielectric material;
 - annealing the layer of ferroelectric dielectric material to form perovskite phases with a first anneal at a first temperature;
 - deposition of an electrically conductive top electrode layer; and
 - annealing the layer of ferroelectric dielectric material with a second anneal at a second temperature higher than the first temperature, the second anneal changing the layer of ferroelectric material into grains having a columnar structure, being performed by rapid thermal annealing and performed after the step of deposition of an electrically conductive top electrode layer.
2. (Original) The process of Claim 1, wherein the electrically conductive bottom electrode layer comprises a noble metal.
3. (Original) The process of Claim 2, wherein the electrically conductive bottom electrode layer comprises platinum.
4. (Original) The process of Claim 1, wherein the ferroelectric dielectric layer comprises PZT.

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5. (Original) The process of Claim 1 wherein the electrically conductive top electrode layer comprises a noble metal oxide.
6. (Original) The process of Claim 5 wherein the electrically conductive top electrode layer comprises Iridium Oxide.
7. (Original) The process of Claim 5 wherein the first anneal comprises a rapid thermal anneal at a temperature between five hundred twenty five and six hundred degrees celsius.
8. (Previously Presented) The process of Claim 1, wherein the first anneal is performed by rapid thermal annealing.
9. (Original) The process of Claim 7 wherein the second anneal is performed at a temperature of between seven hundred and seven hundred fifty degrees celsius.
10. (Original) The process of Claim 9, wherein the second anneal is performed at a temperature of approximately seven hundred twenty five degrees celsius for a duration of greater than ten seconds.
11. (Canceled)
12. (Previously Presented) A method for fabrication of ferroelectric capacitor elements of an integrated circuit comprising:
 - deposition of an electrically conductive bottom electrode layer comprising a noble metal;
 - deposition of a layer of ferroelectric dielectric material;

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annealing the layer of ferroelectric dielectric material to form perovskite phases with a first anneal in an environment comprising oxygen at a first partial pressure;

deposition of an electrically conductive top electrode layer comprising a noble metal oxide; and

annealing the layer of ferroelectric dielectric material with a second anneal, the second anneal changing the layer of ferroelectric material into grains having a columnar structure, being performed in an environment comprising oxygen, the oxygen having a second partial pressure less than the first partial pressure and performed after the step of deposition of an electrically conductive top electrode layer.

13. (Canceled)
14. (Previously Presented) The process of Claim 12, wherein the second anneal is performed by rapid thermal annealing.
15. (Previously Presented) The process of Claim 12 wherein the first partial pressure is less than ten percent of one atmosphere.
16. (Previously Presented) The process of Claim 12 wherein the first anneal is performed by rapid thermal annealing.
17. (Previously Presented) The process of Claim 12 wherein the second anneal is performed in an environment comprising a mixture of oxygen and inert gas.
18. (Canceled)
19. (Previously Presented) The process of Claim 12 wherein the second partial pressure is less than five percent of one atmosphere.

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20. (Previously presented) The process of Claim 12 wherein the first anneal is performed in an environment comprising a mixture of oxygen and inert gas.
21. (Canceled)
22. (Previously Presented) The process of Claim 12 wherein the second anneal is performed at a temperature of between seven hundred and seven hundred fifty degrees celsius for a time not less than ten seconds.
23. (Canceled)
24. (Previously Presented) The process of Claim 12 wherein the step of depositing the ferroelectric dielectric layer is performed by sputtering.
25. (Canceled)
26. (Canceled)
27. (Previously Presented) A method for fabrication of ferroelectric capacitor elements of an Integrated circuit comprising:
- deposition of an electrically conductive bottom electrode layer comprising a noble metal;
 - deposition of a layer of ferroelectric dielectric material by a sputtering method;
 - annealing the layer of ferroelectric dielectric material to form perovskite phases with a first anneal at a first temperature;
 - deposition of an electrically conductive top electrode layer comprising a noble metal oxide; and
 - annealing the layer of ferroelectric dielectric material with a second anneal at a second temperature higher than the first temperature, the second anneal changing the layer of ferroelectric material into grains having a columnar

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structure, being performed by rapid thermal annealing after the step of deposition of an electrically conductive top electrode layer.

Claims 28 - 31 (Canceled)